

REMARKS

In response to the final requirement for restriction, claims 8 - 14, drawn to a nonelected invention, have been cancelled without prejudice to applicants' right to present them in a divisional application. Since this Amendment does not increase either the total number of claims or the number of independent claims (beyond that previously paid for), no additional fee is necessary.

Claims 1 (independent) and 2 - 7 (directly or indirectly dependent on 1) remain in the application. No claim has been allowed, but it is noted that claim 4 has been rejected only on a nonstatutory obviousness-type double patenting ground.

With reference to the rejection of claim 1 under 35 U.S.C. §103(a) as unpatentable over any one of Sato, Katsuoka et al., and Kobayashi et al., it may initially be noted that the claim is directed to a receiving paper for thermal transfer recording, and expressly recites that the claimed paper comprises

- (a) a paper substrate,
- (b) an ink-receiving layer overlying one surface of the substrate and
- (c) a tackifying layer overlying the other surface of the substrate.

Applicants' specification (see application publication No. U.S. 2004/0063579 A1), e.g. at paragraph [0005], indicates that paper is a less expensive substrate than plastic films, but has poor ink receivability and that even when provided with an ink receiving layer of types heretofore proposed (paragraph [0006]), a receiving material with a paper substrate has drawbacks in that "resistance of the recorded images to organic solvents, abrasion and water is not satisfactory" and adhesive applied on the back (for use of the material as a label) deteriorates "because the substrate and the ink-receiving layer do not have barriers against organic solvents

and water" (paragraph [0007]). Thus, the recital of a paper substrate, an ink receiving layer and a tackifying layer (adhesive) in claim 1 defines a combination of elements that presents particular problems when so combined.

None of the references applied in the rejection of claim 1 discloses a paper substrate, or any use of paper in or as a thermal transfer receiving material. In Sato, the substrate is a transparent plastic sheet (col. 2, lines 60-63). Similarly, Katsuoka et al. describes an image-receiving sheet in which the support is "a transparent plastic film" (col. 3, line 12). Again, the "image recording sheet" of Kobayashi et al. is "a transparent support film" (col. 2, lines 34 and 45) of polyester or other plastic (col. 4, lines 5-15).

Furthermore, as the Office Action acknowledges, "none of these references specify applying a tackifying layer on the back of the . . . substrate" (the Action says "paper substrate," but none of the references even mentions paper). The Action asserts that "to do so would have been an obvious expedient . . . in order to adhere the resulting imaged article to something else (e.g., function as a label)." However, apart from the fact that the references do not appear to contemplate label-type products (Sato, for instance, is directed to overhead projector sheets), the combination of a paper substrate and a tackifying layer has been attended by problems which, as hereinafter explained, the present invention overcomes, and which are not suggested in the references.

Claim 1 additionally recites that the ink receiving layer is formed by providing a coating of liquid comprising a resin emulsion on the paper substrate and heating the coating of liquid to a temperature not less than the minimum filming temperature of the emulsion. This is a product-by-process recital, defining a property or characteristic of the ink-receiving layer in terms of the specific process or method used to make it.

In particular, as applicants' specification sets forth (paragraph [0043]),

"MFT means a minimum filming temperature, and the emulsion forms a continuous film when the emulsion is heated to a temperature not less than the MFT thereof. When the temperature of the emulsion is less than the MFT, the emulsion does not form a continuous film, even if a solvent of the emulsion evaporates."

The specification goes on to explain (paragraph [0044]) that

"An effect of providing the process in which the temperature of the surface coating of ink receiving layer material is controlled to be not less than the MFT of the emulsion is that forming a continuous layer of the resin in the ink receiving layer imparts relatively high resistance to organic solvents, water and abrasion to the images recorded thereon, and relatively high resistance to organic solvents and water to the receiving material when it is used as a tackifying layer on the back surface thereof, compared to a case where the resin forms a discontinuous layer."

See also paragraph [0045].

The differences in properties between the receiving papers of the invention, in which the receiving layer forming liquid coating is heated to or above the MFT of the resin emulsion, and those in which the receiving layer forming liquid coating is only heated to a temperature below the MFT of the emulsion, are demonstrated by the Examples and Comparative Examples set forth in applicants' specification. In each of the eight Examples of the claimed invention, the receiving layer was formed by heating the liquid coating to a temperature not less than the MFT, while in all three Comparative Examples, the maximum temperature reached was below the MFT. Table 1 in paragraph [0171] shows that, when subjected to an

abrasion test described in paragraph [0156], none of the images formed on the labels of Examples 1 - 8 was damaged, but the images formed on all three of the labels of Comparative Examples 1 - 3 were damaged. The resistance to alcohol, gasoline and water of adhered labels of all of Examples 1 - 8 of the invention was much higher than that of the adhered labels of any of Comparative Examples 1 - 3.

Thus, the recital of "heating the coating of ink layer forming liquid to a temperature not less than the minimum filming temperature of the resin emulsion" in applicants' claim 1 is a proper product-by-process definition of advantageous and beneficial properties of the formed ink receiving layer, overcoming problems specifically associated with the combination of paper substrate and tackifying layer with which the defined ink receiving layer is itself combined in the receiving paper of claim 1.

None of the three references applied against claim 1 contains any express teaching of forming an ink receiving layer from a liquid coating of resin emulsion by heating the coating to a temperature not less than the minimum filming temperature of the emulsion. Indeed, none of them ascribes any significance to (or even mentions) a minimum filming temperature; and, in the receiving materials they describe, having a plastic sheet or film substrate rather than (as in applicants' claimed invention) a paper substrate, and lacking any adhesive, problems overcome by applicants' invention (in particular, by layer properties achieved by heating at least to the MFT) do not even arise.

In Sato, for instance, the ink receiving layer as initially formed is described as opaque and porous, with cushioning characteristics (col. 2, lines 28-30) and becomes transparent when heated after printing (col. 3, lines 27-35). The minimum filming temperatures of resin emulsions are not set forth; the receiving layer forming material is constituted of polymer particles in a

resin emulsion; and the only temperature concerns expressed are the need to keep the polymer particles from being made into film before printing and to heat the receiving layer (which is no longer liquid) above the glass transition temperature of the polymer particles after printing. This disclosure, if anything, would teach away from heating the liquid coating above the minimum filming temperature, whereby, as applicants disclose, a continuous film is formed.

Katsuoka et al. describes forming an image receiving surface which "consists of an overcoat layer containing an emulsion resin of which glass transition temperature is 50-120°C (col. 2, lines 36-38). To form this image receiving surface (layer), the patent states, an "image-receptive layer coating solution" is prepared, "applied to a support and dried by a known coating method" (col. 5, lines 54-59), but the temperature of drying is not mentioned. Even in the Examples given in the patent (cols. 7 and 8), the temperature at which the coating solution is "dried" is not given. As applicants' specification makes clear (paragraph [0043], quoted above), the emulsion may be dried - "a solvent of the emulsion evaporates" - at temperatures below the minimum filming temperature. Hence, the Katsuoka et al. description of drying at unspecified temperatures does not constitute an inherent disclosure, or even a suggestion, of heating a liquid coating to a temperature not less than the minimum filming temperature, as applicants' claim 1 recites.

Kobayashi et al. states that "Water-soluble resins, emulsion resins and resins soluble in organic solvents are employable for the formation of the image-receiving layer" (col. 4, lines 50-52). Various ranges or values of drying times for image receiving layer coatings are given in the detailed description (e.g., col. 16, lines 54-57; col. 22, lines 46-48; col. 24, lines 35-38) but with no indication of whether these are in fact at or above a minimum

filming temperature. Again, there is no mention of minimum filming temperature, much less any suggestion of its importance or criticality for solving problems that are not even encountered in the recording sheets (having plastic film rather than paper substrates or supports, and no adhesive) with which Kobayashi et al. is exclusively concerned.

It is therefore submitted that the recital, in claim 1, of "an ink receiving layer . . . formed by . . . heating the coating of ink layer forming liquid to a temperature not less than the minimum filming temperature of the resin emulsion," especially in the defined combination with a paper substrate and tackifying layer, presents a patentable distinction over each of Sato, Katsuoka et al. and Kobayashi et al. Claims 2 - 7, being dependent on claim 1, are submitted to distinguish patentably over the references in like manner.

Turning to the provisional obviousness-type double patenting rejection of claim 1 - 7 as unpatentable over claims 1, 5 and 12 of applicants' copending application No. 10/308,536 (publication No. US 2003/0133004 A1) it is respectfully submitted that all the present claims are patentable thereover.

In the first place, claims 1, 5 and 12 of application No. 10/308,536 are directed to a receiving cloth, wherein the substrate comprises a woven or nonwoven fabric. Present claims 1 - 7 are all expressly limited to a paper substrate.

Secondly, none of claims 1, 5 and 12 calls for an ink receiving layer formed by heating a "coating of ink layer forming liquid to a temperature not less than the minimum filming temperature of the resin emulsion," as present claim 1 recites.

The Office Action states that one "must look to the specification to interpret the claims (e.g. determine how to apply the receiving layer?). In the latter case, the specification describes the advantages of applying the receiving layer as an emul-

sion and then drying." As understood, the passage just quoted refers to the specification of application No. 10/308,536. That specification, however, does not teach that the applied emulsion layer is heated at least to the minimum filming temperature of the emulsion. As applicants' present specification sets forth (paragraph [0043], cited above), drying can be achieved without heating up to the MFT of the emulsion. Consequently, claims 1, 5 and 12 of application No. 10/308,536, construed in light of the specification of that application, do not make obvious the combination of a paper substrate with an ink receiving layer formed by heating a liquid coating comprising a resin emulsion to a temperature not less than the minimum filming temperature of the emulsion.

It follows that the recital of that combination in present claim 1 distinguishes claims 1 - 7 patentably over claims 1, 5 and 12 of application No. 10/308,536, however construed.

For the foregoing reasons, it is believed that this application is now in condition for allowance. Favorable action thereon is accordingly courteously requested.

Respectfully,

Christopher C. Dunham
Christopher C. Dunham
Reg. No. 22,031
Attorney for Applicants
Tel. (212) 278-0400

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Christopher C. Dunham
Christopher C. Dunham, Reg. No. 22,031
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